Math 448/548, Cpt S 430/530—Numerical Analysis
Spring 2005
Tu, Th 1:25–2:40 p.m. Fulmer 201
Please note that this document has three pages.

Instructor

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Outline of course

In this course we study the design and implementation of computational algorithms for several important generic classes of mathematical problems. It is well known that when mathematically posed, problems in many disciplines (including the sciences and engineering disciplines) lead to these generic mathematical problems. We will study properties of these computational algorithms so that we would be able to appropriately choose an algorithm and software implementing it when we need to numerically solve an instance of one of these generic mathematical problems.
We will use the textbook *Fundamentals of Numerical Computing* by L. F. Shampine, R. C. Allen, Jr., and S. Pruess (Wiley, 1997).
The specific topics to be covered are as follows.

(a) Errors and floating point arithmetic

(b) Systems of linear equations

(c) Interpolation

(d) Roots of nonlinear equations

(e) Numerical integration

(f) Ordinary differential equations

Grades

The course grades will be based on homework assignments, and a comprehensive take-home final examination weighted as follows.

- Homework assignments—70%
- Comprehensive take-home final examination—30%

Students enrolled in the undergraduate versions (Math 448, Cpt S 430) and the graduate versions (Math 548, Cpt S 530) will have different versions of assignments and the final examination. *Please make sure to solve the version appropriate for the course you are enrolled in.*

The purpose of basing the grades on homework assignments, and a take-home final examination (rather than on more time-restrictive tests) is to give you enough time to think about the problems and to learn the material covered in class. *You are therefore expected to provide complete answers to the problems.* Since there are no in-class tests, the quality, independence, and originality expected in your solutions for problems in the homework assignments, and the final examination are higher than in a course with in-class tests. Clear and logical presentation of your solutions is also important.
You are advised to start working on the homework assignments, and the take-home final examination as soon as possible (and not wait until just before the deadlines).

Work that you submit for grading must have been completed by you based only on your own efforts.

Course web page

There is a web page for this course, which may be accessed from my home page at the URL indicated above via the link "Math 448/548, Cpt S 430/530". Homework assignments, the final examination, and other announcements will be posted on this web page. *Please check this web page regularly.*

Reading

I shall closely follow the topics discussed in the textbook. It is advisable to read the textbook before and after the relevant material is discussed in class on a regular basis. This reading of the textbook is considered to be a homework assignment made now for the rest of the semester.

Computing

- *Computing is an essential part of this course, and would be necessary in the solution of problems in the assignments and the final examination.*

- The authors of the text book provide FORTRAN 77, FORTRAN 90, C, C++, and MATLAB codes for algorithms discussed in the text book. These codes may be obtained by means of anonymous ftp. Please see p. vii of the text book.
- I would strongly advise you to work with MATLAB codes. The knowledge you gain on using MATLAB is almost certain to be useful to you in the future. Since the codes for algorithms we study are available to you, I will expect you to independently learn any additional details on MATLAB that become necessary. I would strongly recommend the book

  MATLAB Primer, Seventh Edition
  by T. A. Davis and K. Sigmon
  Chapman & Hall/CRC (http://www.crcpress.com), 2005.

- All students in Math 448/548, Cpt S 430/530 will be able to have accounts on Linux computers of the Department of Mathematics with MATLAB. Please see the *Note on Creating Accounts on Laboratory Computers of the Department of Mathematics and Accessing MATLAB. It is not necessary that you use MATLAB on Department of Mathematics computers. Please feel free to use any alternative access to MATLAB that you may have.* A reasonably-priced student version of MATLAB is available from MathWorks (http://www.mathworks.com).

Disability Resource Center (DRC)

Reasonable accommodations are available for students who have a documented disability. Please notify the instructor during the first week of classes for any accommodations needed for the course. Late notification may result in the requested accommodations to be unavailable. All accommodations must be approved through the DRC in Administration Annex, room 205 (335-1566, drc@mail.wsu.edu) in Pullman.